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EXAMINER	
CHANG, EDITH M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	**Application No.** 09/737,196	**Applicant(s)** ODE ET AL.	
	Examiner Edith M Chang	**Art Unit** 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 December 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-10,14-21 and 23-40* is/are rejected.

7)☒ Claim(s) *5-7,11-13 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 December 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/dec 14 2000*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "limit-level surpass detector" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show "limit surpass detector 82" in the figure 30 as described in the specification page 71 line 3. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d).

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 3-13, 21-27, and 29, are objected to because of the following informalities:

Claims 3, 8, 21, & 25, it suggests to adding legends of the "p" and of "n" in hn(p) to indicate what are the "p" and "n", the characteristics, ranges, etc. when it appears first time in the claim.

Claims 5, 11-12, & 22, it suggests to adding a legend of the "m" to indicate its range/characteristic, as it appears first time in the claim.

Claim 12, it suggests to adding a legend of the "[ ]" in '[=h_{n+1} (p) /m]".

Claim 21, lines 25-26 page 105, the term "to distortion compensation processing" is suggested to be changed to "to a distortion compensation processing"; line 1-2 page 106, the term "to distortion compensation processing" is suggested to be changed to "to the distortion compensation processing"; line 11-12 page 106, the term "the distortion compensation thereof" is suggested to be changed to "the distortion compensation processing thereof",

Claims 23-24, 26, & 29, the term "a frequency shift decided by carrier frequency spacing" does not indicate/include an object operated by the frequency multipelexer. It suggests to changing it to "a frequency shift signal…" or "frequency shift signals…" to indicate the invention.

The term "a set upper-limit power Pmax" is suggested to be changed to "an upper-limit power Pmax" in all claims that include this term.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 20, 23-24 and 26-27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The "a second frequency multiplexing unit for converting the frequency-shifted signals to analog signals" is not taught in the written specification (page 85 lines 22-27) or in the drawing that the second frequency multiplexing unit for converting the frequency-shifted signals to analog signals.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-13, & 34-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3, " wherein said distortion compensation coefficient updating unit updates a distortion compensation coefficient by storing a corrected distortion compensation coefficient $h_{n+1}(p)'$ in said memory when the power Pa of the transmit signal is greater than the upper-limit power Pmax", however the corrected distortion compensation coefficient $h_{n+1}(p)'$ created from the distortion compensation coefficient correction unit that in such a manner that power Pa of the transmit signal will fall below that upper-limit power Pmax. The conditions of updating a distortion compensation coefficient by storing a corrected distortion compensation coefficient $h_{n+1}(p)'$ in said memory is when the power Pa of the transmit signal is greater than the upper-limit power Pmax, in such condition there is no corrected distortion compensation coefficient created for updating. The condition is conflict in the correction unit and the updating unit as stated in the claim.

Claim 8, "wherein when the square of the distortion compensation coefficient is greater than the square of the maximum distortion compensation coefficient, said distortion compensation coefficient updating unit updates the distortion compensation coefficient that has been stored in said memory by the corrected distortion compensation coefficient." Where the corrected distortion compensation coefficient is created/provided by the correction unit when the square of the distortion compensation coefficient will become smaller than the square of the distortion compensation coefficient, however the updating unit updates the coefficient by the corrected distortion compensation coefficient created/provided when the coefficient is greater than the square of the maximum coefficient, in such condition there is no corrected distortion compensation coefficient created for updating.

Claims 34-36, "multiplying the transmit signal before the distortion compensation thereof by k" is not taught in the specification page 73 line 24-page 74 line3, and drawing figure 36.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. (US 6400774 B1) in view of Mandyam (US 6167273).

Regarding **claim 1**, except explicitly specify the distortion compensation coefficient correction unit that the transmit signal will not exceed a dynamic range of the DA converter, Matsuoka et al. discloses all subject matter: a distortion compensating apparatus for compensating for distortion of a transmission power amplifier (Abstract, FIG.8), comprising: a memory for storing distortion compensation coefficients (404/416 FIG.8); a predistortion unit for subjecting a transmit signal to distortion compensation processing (110 FIG.8 is the predistortion unit); a DA converter (111 FIG.8) for converting a digital transmit signal, which has been subjected to distortion compensation processing, to an analog signal input to the transmission power amplifier (117 FIG.8 is the transmission power amplifier); a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well) based upon a transmit signal before the distortion compensation (BASBAND I/Q SIGNAL 102 FIG.8 is the transmit signal) and a feedback signal fed back from an output side of the transmission power amplifier (219 FIG.8 the feedback signal from an output side of 117/power amplifier FIG.8); a distortion compensation coefficient updating unit for updating a coefficient stored in the memory by the corrected one (420 FIG.8, column 35 lines 44-46, wherein the 420 updates the memory 404 with the corrected/new coefficient). However Mandyam teaches the limited dynamic range of the DA for power amplifier (46, 68 FIG.6, column 6 line 50-column 7 line 17, where the function implemented in 68 FIG.6). As Matsuoka et al. using the DA before feeding in the signal to the power amplifier, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the unit performing the limited dynamic range of the DA on the

transmit signal taught by Mandyam in the Matsuoka et al.'s correcting portion for correcting the distortion compensation coefficient in such a manner that the transmit signal that has subjected to the distortion compensation processing will not exceed a dynamic range of the DA converter, to meet the quality of service level constrain of CDMA (column 5 lines 27-35).

Regarding **claim 18**, except explicitly specify the distortion compensation coefficient correction unit that the transmit signal will not exceed a dynamic range of the DA converter, Matsuoka et al. discloses a distortion compensating apparatus for compensating for distortion of a transmission power amplifier (Abstract, FIG.8), comprising: a memory for storing distortion compensation coefficients (404/418 FIG.8); an error signal generator (418-420 FIG.8, column 35 lines 34-55, where the error signal is the difference between the baseband component of the transmit signal that is before compensation, and the recovered signal that is subjecting the compensation); a DA and a combiner (112 FIG.8) for converting the error signal to analog signal and adding to an analog transmit signal; a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well) based upon a transmit signal before the distortion compensation (BASBAND I/Q SIGNAL 102 FIG.8); a distortion compensation coefficient updating unit for updating a coefficient stored in the memory by the corrected one (420 FIG.8, column 35 lines 44-46, wherein the 420 updates the memory 404 with the corrected/new coefficient). However Mandyam teaches the limited dynamic range of the DA for power amplifier (46, 68 FIG.6, column 6 line 50-column 7 line 17, where the function implemented in 68 FIG.6). As Matsuoka et al. using the DA before feeding in the signal to the power amplifier, at the time of the

invention, it would have been obvious to a person of ordinary skill in the art to implement the unit performing the limited dynamic range of the DA on the transmit signal taught by Mandyam in the Matsuoka et al.'s correcting portion for correcting the distortion compensation coefficient in such a manner that the transmit signal that has subjected to the distortion compensation processing will not exceed a dynamic range of the DA converter, to meet the quality of service level constrain of CDMA (column 5 lines 27-35).

9. Claims 3, 8, 10, 14, 16, 21, 25, 28, 31, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. (US 6400774 B1) in view of Barber (US 6230031 B1).

Regarding **claims 3 & 8**, except explicitly specify the comparator for comparing power of a transmit signal and an upper-limit power, Matsuoka et al. discloses a distortion compensating apparatus having: a memory (404 FIG.8), a predistortion unit (110 FIG.8) for reading a distortion compensation coefficient hn (p); a DA converter (111 FIG.8); a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient hn+1 (p); a distortion compensation coefficient updating unit (420 FIG.8) storing the hn+1 (p) in the memory (420-404 FIG.8), comprising the correction unit for correcting the coefficient (102-420-418 FIG.8 performing the correction, column 24 lines 24-34 where the amplitude/power of the signal is calculated, wherein the power is the square of the amplitude) and the updating unit (420 FIG.8). However Barber teaches a comparator for comparing power of a transmit signal and an upper-limit power (FIG.7, column 7 lines 45-65). As Matsuoka et al. having the power calculating portion (102 FIG.8, in Abstract the second distortion compensating coefficient/ h_{n+1} (p)' determined in response to the calculated power-related value, so the

comparing does on the amplitude and coefficient as well), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the comparator for comparing power taught by Barber in the correction unit of the Matsuoka et al.'s system as the maximum distortion compensation coefficient output unit for the h(p)max as the upper-limit power, to have the power amplifying circuitry support the wireless telephone systems such as CDMA, TDMA (column 1 lines 15-23, lines 47-55) and compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claim 10**, Matsuoka et al. discloses a table for storing the signals and its related coefficients (column 33 lines 37-48).

Regarding **claims 14 & 16**, except explicitly specify the upper-limit power, Matsuoka et al. discloses a distortion compensating apparatus comprising: a memory for storing compensation coefficients (404/416 FIG.8); a predistortion unit using a compensation coefficient (110 FIG.8); a DA converter for converting a digital transmit signal input to the power amplifier (111 FIG.8); a coefficient calculation unit for calculating a coefficient based upon a transmit signal before the compensation (420/418 FIG.8); a table for storing in advance in association with combinations of square of the input signal and compensation coefficient, corrected coefficients (column 33 lines 38-50, where the compensation coefficients and calculated amplitude/the calculated power will be provided as a reference table in advance). However Barber teaches a comparator for comparing power of a transmit signal and an upper-limit power (FIG.7, column 7 lines 45-65). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the comparator for comparing power taught by Barber in Matsuoka et al.'s correcting portions (comparing to the upper-limit power) to have the

power amplifying circuitry support the wireless telephone systems such as CDMA, TDMA (column 1 lines 15-23, lines 47-55) and compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claim 21**, except explicitly specify the comparator for comparing power of a transmit signal and an upper-limit power, Matsuoka et al. discloses a distortion compensating apparatus having a memory (404 FIG.8); an error signal generator (418-420 FIG.8, column 35 lines 34-55, where the updating portion reading a compensation coefficient generates a error signal); a DA and a combiner (112 FIG.8) for converting the error signal to analog signal and adding to an analog transmit signal; a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well); a distortion compensation coefficient updating unit for updating a coefficient stored in the memory by the corrected one (420 FIG.8, column 35 lines 44-46, wherein the 420 updates the memory 404 with the corrected/new coefficient). However Barber teaches a comparator for comparing power of a transmit signal and an upper-limit power (FIG.7, column 7 lines 45-65). As Matsuoka et al. having the power calculating portion (102 FIG.8, in Abstract the second distortion compensating coefficient determined in response to the calculated power-related value), at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement the comparator for comparing power taught by Barber in the correction unit of the Matsuoka et al.'s system for the h(p)max as the upper-limit power, to have the power amplifying circuitry support the wireless telephone systems such as CDMA,

TDMA (column 1 lines 15-23, lines 47-55) and compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claims 25 & 28**, except explicitly specify the upper-limit power, Matsuoka et al. discloses a distortion compensating apparatus comprising: a memory for storing compensation coefficients; an error signal generator (420 FIG.8, column 35 lines 34-45, where the updating portion reading a compensation coefficient generates a error signal which is the difference between a transmit signal before and after the distortion processing); a DA and a combiner (112 FIG.8) for converting the error signal to analog signal and adding to an analog transmit signal; a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well) based upon a transmit signal before the distortion compensation (BASBAND I/Q SIGNAL 102 FIG.8); a distortion compensation coefficient updating unit for updating a coefficient stored in the memory by the corrected/calculated one (420 FIG.8, column 35 lines 44-46, wherein the 420 updates the memory 404 with the corrected/new coefficient); a table for storing in advance in association with combinations of square of the input signal and compensation coefficient, corrected coefficients (column 33 lines 38-50, where the compensation coefficients and calculated amplitude/the calculated power will be provided as a reference table, the memory is a table as well for storing); a distortion compensation coefficient updating unit for updating a coefficient stored in the memory by the corrected one (420 FIG.8, column 35 lines 44-46, wherein the 420 updates the memory 404 with the corrected/new coefficient). However Barber teaches a comparator for comparing power of a transmit signal and an upper-limit power (FIG.7,

column 7 lines 45-65). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the comparator for comparing power taught by Barber in Matsuoka et al.'s system (where setting the upper-limit to the square of the maximum of the signal or the square of the maximum of the coefficient results the same effect) to have the power amplifying circuitry support the wireless telephone systems such as CDMA, TDMA (column 1 lines 15-23, lines 47-55) and compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claim 31**, Matsuoka et al. discloses a distortion compensating apparatus comprising: a memory for storing compensation coefficients; an error signal generator (420 FIG.8, column 35 lines 34-45, where the updating portion reading a compensation coefficient generates a error signal which is the difference between a transmit signal before and after the distortion processing); a predistortion unit for subjecting a transmit signal to distortion compensation processing (110 FIG.8 is the predistortion unit); a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well), however does not specify an amplitude controller for controlling amplitude of the feedback signal. Barber teaches an amplitude controller for controlling amplitude of the feedback signal (242 FIG.10 is the amplitude controller for controlling amplitude of the feedback signal from the power amplifier 228 FIG.10, column 10 lines 30-32). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the amplitude controller taught by Barber in Matsuoka et al.'s system to control the feedback signal from the power amplifier to compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claim 38**, Matsuoka et al. discloses a memory for storing distortion compensation coefficients (404/418 FIG.8); an error signal generator (418-420 FIG.8, column 35 lines 34-55, where the updating portion reading a compensation coefficient generates a error signal); a DA and a combiner (112 FIG.8) for converting the error signal to analog signal and adding to an analog transmit signal.

10. Claims 2 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. (US 6400774 B1) in view of Mandyam (US 6167273) as applied to claims 1 and 18 above, and further in view of Wismer (US 6212378 B1).

Regarding **claim 2**, further Wismer teaches the frequency multiplexer (FWD. CONTROL SIG. FREQ. MPX Fig.4) for multiplexing digital transmit signals to a frequency shift decided by carrier frequency spacing (426a-426n, column 4 lines 57-60, column 12 lines 36-45, where each 426 has its frequency) before the power amplifier (430 Fig.4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the frequency multiplexer taught by Wismer in Matsuoka et al.'s system to get the frequency-multiplexed transmit signal as the input signal of the RF amplifier to have the Matsuoka et al.'s system to compensate the distortion of the RF amplifier used in the mobile cellular communication system as CDMA, GSM, etc.

Regarding **claims 19 & 20**, further Wismer teaches the first frequency multiplexer/frequency shifting means (FWD. CONTROL SIG. FREQ. MPX Fig.4) for multiplexing digital transmit signals to a frequency shift decided by carrier frequency spacing (426a-426n, column 4 lines 57-60, column 12 lines 36-45, where each 426 has its frequency) and a second

frequency multiplexer converting the frequency shifted signals to analog signals and combining the analog signals (where the FWD. CONTROL SIG. FREQ. MPX Fig.4 multiplexing and converting the input digital signals form the 420 PROCESSOR to the analog signal to the power amplifier 430 Fig.4), and means for inputting the analog frequency-multiplexed signal before the power amplifier (430 Fig.4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the frequency multiplexer taught by Wismer in Matsuoka et al.'s system to get the frequency-multiplexed transmit signal as the input transmit signal to the system where it needs the input transmit signal (which includes the error signal generator) to have the Matsuoka et al.'s system to compensate the distortion of the RF amplifier used in the mobile cellular communication system as CDMA, GSM, etc.

11. Claims 4, 9, 15, 17, 23-24, 26-27, 29-30, and 39-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. (US 6400774 B1) in view of Barber (US 6230031 B1) as applied to claims 3, 8, 14, 16, 25, 28 and 31 above, and further in view of Wismer (US 6212378 B1).

Regarding **claims 4, 9, 15, 17, 29 & 39**, further Wismer teaches the frequency multiplexer (FWD. CONTROL SIG. FREQ. MPX Fig.4) for multiplexing digital transmit signals to a frequency shift decided by carrier frequency spacing (426a-426n, column 4 lines 57-60, column 12 lines 36-45, where each 426 has its frequency) before the power amplifier (430 Fig.4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the frequency multiplexer taught by Wismer in Matsuoka et al.'s system to get the frequency-multiplexed transmit signal as the input signal of the RF amplifier to have the

Matsuoka et al.'s system to compensate the distortion of the RF amplifier used in the mobile cellular communication system as CDMA, GSM, etc.

Regarding **claim 20**, further Wismer teaches the frequency multiplexer (FWD. CONTROL SIG. FREQ. MPX Fig.4) for multiplexing digital transmit signals to a frequency shift decided by carrier frequency spacing (426a-426n, column 4 lines 57-60, column 12 lines 36-45, where each 426 has its frequency) and converting the frequency shifted signals to analog signals and combining the analog signals (where the FWD. CONTROL SIG. FREQ. MPX Fig.4 multiplexing and converting the input digital signals form the 420 PROCESSOR to the analog signal to the power amplifier 430 Fig.4), and means for inputting the analog frequency-multiplexed signal before the power amplifier (430 Fig.4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the frequency multiplexer taught by Wismer in Matsuoka et al.'s system to get the frequency-multiplexed transmit signal as the input signal of the RF amplifier to have the Matsuoka et al.'s system to compensate the distortion of the RF amplifier used in the mobile cellular communication system as CDMA, GSM, etc.

Regarding **claims 23-24**, **26-27**, **30**, & **40** further Wismer teaches the first frequency multiplexer/frequency shifting means (FWD. CONTROL SIG. FREQ. MPX Fig.4) for multiplexing digital transmit signals to a frequency shift decided by carrier frequency spacing (426a-426n, column 4 lines 57-60, column 12 lines 36-45, where each 426 has its frequency) and a second frequency multiplexer converting the frequency shifted signals to analog signals and combining the analog signals (where the FWD. CONTROL SIG. FREQ. MPX Fig.4 multiplexing and converting the input digital signals form the 420 PROCESSOR to the analog signal to the power amplifier 430 Fig.4), and means for inputting the analog frequency-multiplexed signal before the

power amplifier (430 Fig.4). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the frequency multiplexer taught by Wismer in Matsuoka et al.'s system to get the frequency-multiplexed transmit signal as the input transmit signal to the system where it needs the input transmit signal (which includes the error signal generator) to have the Matsuoka et al.'s system to compensate the distortion of the RF amplifier used in the mobile cellular communication system as CDMA, GSM, etc.

12. Claims 32-33, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. (US 6400774 B1) in view of Kawano et al. (US 6201490 B1).

Regarding **claims 32 & 33**, except explicitly specify (1) a limit-level surpass detector for the transmit signal and (2) an amplitude controller for controlling the amplitude of the feedback signal, Matsuoka et al. discloses a distortion compensating apparatus for compensating for distortion of a transmission power amplifier (Abstract, FIG.8), comprising: a memory for storing distortion compensation coefficients (404/418 FIG.8); a predistortion unit for subjecting a transmit signal to distortion compensation processing (110 FIG.8 is the predistortion unit); a DA converter (111 FIG.8) for converting a digital transmit signal, which has been subjected to distortion compensation processing, to an analog signal input to the transmission power amplifier (115 FIG.8 is the transmission power amplifier); a distortion compensation coefficient calculation unit (420&418 FIG.8) for calculating a distortion compensation coefficient (column 35 lines 1-27 where the 420 does the calculation/computation; column 35 lines 36-45 where the 418 does the calculation as well).

With respect to the item (1), Kawano et al. teaches a limit-level surpass detector (3/16 FIG.1, 7/16 FIG.3). As Matsuoka et al. using the DA converter for the transmit signal, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the limit-level surpass detector taught by Kawano et al. in Matsuoka et al.'s system to provide a wide dynamic range (column 1 lines 5-15).

With respect to the item (2), Barber teaches an amplitude controller for controlling amplitude of the feedback signal (242 FIG.10 is the amplitude controller for controlling amplitude of the feedback signal from the power amplifier 228 FIG.10, column 10 lines 30-32). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have the amplitude controller taught by Barber in Matsuoka et al.'s system to control the feedback signal from the power amplifier to compensate the signal losses (column 1 lines 55-column 2 line 20).

Regarding **claim 37**, Matsuoka et al. discloses a DA converter (111 FIG.8) for converting a digital transmit signal, which has been subjected to distortion compensation processing, to an analog signal input to the transmission power amplifier (115 FIG.8 is the transmission power amplifier) as claimed.

Allowable Subject Matter

Claims 5-7, 11-13, and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and overcome the objections stated in the paragraph 3.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edith M Chang whose telephone number is 703-305-3416. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Edith Chang
February 5, 2004

CHIEH M. FAN
PRIMARY EXAMINER